



***ENOUGH IS ENOUGH !!***

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# Requirements – Your Project's Foundation

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- Get them right up front – the first time
  - Spend time assuring mutual understanding and agreement
  - Formal Process – always
    - Written down and signed
    - Specific and complete
    - Quantitative where possible
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# Rossi X-Ray Timing Explorer (RXTE)

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- Fixed price project - \$250M
  - 3 instruments
    - Major instrument – Proportional Counter Array
      - 5 proportional counters – largest ever flown
      - Thin film window containing P10 gas
  - Spacecraft and PCA - in-house developments
    - GSFC Engineering Directorate
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# RXTE Requirements Documented Early

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- Project Plan signed before the end of Phase B
  - Planning given extra attention due to fixed price
  - Level 1 Requirements spelled out
    - XTE – 2 year life
    - PCA – 4 of 5 modules for successful mission
  - Negotiated and signed by Project, Science Team, and Headquarters
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# Late-breaking Problem!

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- Spacecraft mostly integrated
  - All instruments finishing assembly
  - PCA module developed serious leak
    - Seal between window and frame
    - 4 of 5 sealed OK, 5<sup>th</sup> leaked badly
    - Scientists worried about design flaw
    - Requested S/C add a P10 replenishment system
  - Engineering Directorate agreed to do it
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# Major Hit to Schedule and Cost

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- Halt Spacecraft Integration & Test
  - Develop new subsystem
  - Expand test program
  - Complicated PCA interface with Spacecraft
    - Changes to finished PCA modules
  - Other instruments could slip their delivery
  
  - The Project said “NO!”
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# Enough is Enough!

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- Project held the line in spite of Pressure from Scientists and Engineering
  - They couldn't argue with the agreed-to requirements
  - Scientists and engineers redoubled their efforts to fix the leak.
    - Confirmed that it wasn't a design problem
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# Today...

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- RXTE is still scientifically productive
    - 7 years in orbit
    - No PCA degradation
  - RXTE was ready for launch on schedule and ~ \$40M under fixed price development budget
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# Remember!!

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